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ABSTRACT

This study presents a test of the Anxiety-Expectation Mediation (AEM) model of library anxiety. The AEM model contains variables that are directly or indirectly related to information search performance, as measured by students' scores on their research proposals. This model posits that library anxiety and self-perception serve as factors that mediate the relationship between performance in writing a research proposal and other cognitive, personality, and demographic variables. The model was tested using 225 graduate students enrolled in several sections of an introductory-level course at a mid-southern university. Structural equation modeling techniques supported the AEM model. In particular, library anxiety and research achievement were reciprocally related. Furthermore, library anxiety mediated the relationship between research performance and the following variables: age, grade point average, learning style, academic procrastination, and self-perception. The path analysis also revealed a direct positive path from self-perception to research performance. In addition, self-perception moderated the relationship between research achievement and academic procrastination, perfectionism, and hope. The AEM model of library anxiety suggests that Wine's (1980) Cognitive-Attentional-Interference theory, Onwuegbuzie, Jian, and Bostick's (2002) Information Literacy Process model of library anxiety, and Bandura's (1977) self-efficacy theory can be applied to the library context. Findings are discussed within the framework of current social-psychological models of educational achievement. (Contains 94 references.) (Author/MES)

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# Anxiety-Expectation Mediation Model of Library Anxiety

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Abstract

This study presents a test of the Anxiety-Expectation Mediation (AEM) model of library anxiety. The AEM model contains variables that are directly or indirectly related to information search performance, as measured by students' score on their research proposals. This model posits that library anxiety and self-perception serve as factors that mediate the relationship between performance in writing a research proposal and other cognitive, personality, and demographic variables. The model was tested using 225 graduate students enrolled in several sections of an introductory-level course at a mid-southern university. Structural equation modeling techniques supported the AEM model. In particular, library anxiety and research achievement were reciprocally related. Furthermore, library anxiety mediated the relationship between research performance and the following variables: age, grade point average, learning style, academic procrastination, and self-perception. The path analysis also revealed a direct positive path from self-perception to research performance. In addition, self-perception moderated the relationship between research achievement and academic procrastination, perfectionism, and hope. The AEM model of library anxiety suggests that Wine's (1980) Cognitive-Attentional-Interference theory, Onwuegbuzie, Jiao, and Bostick's (2002) Information Literacy Process model of library anxiety, and Bandura's (1977) self-efficacy theory can be applied to the library context. Findings are discussed within the framework of current social-psychological models of educational achievement.

## Anxiety-Expectation Mediation Model of Library Anxiety

Research has consistently demonstrated that academic-related anxiety is one of the biggest threats to the educational performance of students at the primary and secondary school levels. Forms of academic-related anxiety that have been identified to have a debilitative affect on students' outcomes include mathematics anxiety (e.g., Bander & Betz, 1981; Morris, 1981), writing anxiety (e.g., Hadfield, Martin, & Wooden, 1992), foreign language anxiety (e.g., Hart, 1993), and test anxiety (e.g., Hill & Wigfield, 1984). In addition to these state-based forms of anxiety, other types of academic-related anxiety have been found to be negatively related to student outcomes at the college level, including computer anxiety (e.g., Gressard & Loyd, 1987; Jennings & Onwuegbuzie, 2001; Loyd & Gressard, 1984), research anxiety (Onwuegbuzie, 1997a, 1997b, 1997c, 1997d), and statistics anxiety (e.g., Onwuegbuzie, DaRos, & Ryan, 1997; Onwuegbuzie, Slate, Paterson, Watson, & Schwartz, 2000; Zeidner, 1991).

However, of all the forms of academic-related anxiety that prevail at the college level, library anxiety appears to be among the most common, likely because virtually every student is required to use the library at some point in their programs of study (Onwuegbuzie, Jiao, & Bostick, in press). As defined by Onwuegbuzie et al. (in press), library anxiety represents a negative experience typified by extreme apprehension, fear, panic, self-defeating thoughts, uneasiness, tension, stress, and physiological arousal that occurs during one or more of the following three stages of the library-task cycle: library preparation, library use, and library reflection.

Mellon (1986) reported that between 75% and 85% of undergraduate students

experience uncomfortable levels of library anxiety. Similarly, although prevalence rates presently do not exist, library anxiety appears to be encountered by a significant proportion of graduate students (Onwuegbuzie et al., in press). Moreover, high levels of library anxiety have been associated with an array of negative outcomes. For example, while searching for books, periodicals, or other documents, a student with high levels of library anxiety may misread or overlook signs and printed directions, misunderstand advice and cues, refrain from seeking help, or prematurely end their search (Keefer, 1993; Kuhlthau, 1988a, 1991). Further, compared to low-anxious students, high-anxious students often have low self-perceptions about their ability to use effectively the library in general and to conduct library searches in particular. These perceptions, whether accurate or inaccurate, typically lead to confusion, guilt, embarrassment, regret, and concealment, further culminating in avoidance behaviors. These behaviors subsequently prevent high-anxious students from fostering adequate library research skills (Mellon, 1986). Consistent with these observations, Jiao and Onwuegbuzie (2002a) computed that students with high levels of library anxiety are approximately two-and-a-half times less likely to visit the library than are low-anxious students.

Despite the prevalence of library anxiety among college students, only one empirical study has been conducted investigating whether library anxiety predicts educational outcomes. Specifically, using multiple regression techniques, Onwuegbuzie (1997a) found that library anxiety associated with affective barriers and knowledge of the library were both moderate predictors of graduate students' ability to write a research proposal. That is, students who attained the lowest levels of performance for

their research proposals tended to have high levels of library anxiety associated with affective barriers and knowledge of the library.

As a result of the lack of research in this area, the role of library anxiety in educational outcomes remains unclear. Because it can be argued that for many students, learning how to use the library in general and to conduct library searches in particular is similar to learning a foreign language (Mellon, 1986, 1988; Onwuegbuzie, 1997a), it is possible that one or more models of second language acquisition is applicable to the library context. One model of foreign language learning that might transfer to the library setting is the *Anxiety-Expectation Mediation* (AEM) model of foreign language achievement that was theorized and tested by Onwuegbuzie, Bailey, and Daley (2002). These researchers used path analysis techniques to develop their model. According to Onwuegbuzie et al.'s (in press) AEM model of foreign language achievement, one cognitive variable (i.e., anxiety) and one affective variable (i.e., expectation of foreign language achievement) are related to each other in a reciprocal manner. Further, anxiety and achievement play a role in the foreign language learning context such that a change in either one would culminate in changes in the other, in order to re-establish the equilibrium. Also in the AEM model, anxiety and foreign language achievement are reciprocally related--with a direct negative path from anxiety to achievement, and a similar direct negative path from achievement to foreign language anxiety. Additionally, there is a direct positive path from expectation to achievement. As a result, anxiety and expectation both serve as factors in the model that mediate the relationship between foreign language performance and other

cognitive, personality, and demographic variables.

Interestingly, in a follow-up study, Onwuegbuzie (in press) found that the *Anxiety-Expectation Mediation* (AEM) model is also applicable to the context of learning statistics. Onwuegbuzie's model consists of a direct negative effect of statistics anxiety on statistics achievement, as well as a direct positive effect of statistics performance expectation on statistics achievement. Further, statistics anxiety and expectation are reciprocally related. The model also contains a direct negative path from course load to statistics achievement. Finally, statistics anxiety mediates the relationship between statistics achievement and the following variables: number of college-level statistics courses taken, study habits, research anxiety, and course load; whereas performance expectation mediates the relationship between statistics achievement and research anxiety.

To date, no empirical model of library anxiety has been proposed. Moreover, no other study has examined whether library anxiety mediates and/or moderates the relationship between cognitive, affective, personality, and demographic variables and academic performance among college students. This was the goal of the present investigation. Specifically, the purpose of the present study was to utilize structural equation modeling techniques to investigate the role of library anxiety and various cognitive, affective, personality, and demographic variables in predicting the quality of research proposals written by college students. As such, this study was the first to use structural equation modeling techniques in the area of library anxiety, and among the first investigations to use this technique in the library context.

Structural equation modeling is a technique for studying the direct and indirect effects of variables on one of more outcomes. In structural equation modeling, latent variables are used rather than observed variables. This type of analysis involves combining a measurement model (i.e., confirmatory factor analysis) with a structural model (i.e., path analysis) to substantiate theory (Schumacker & Lomax, 1996). By using multiple observed variables in defining a specific latent variable or hypothesized construct, measurement error can be estimated, and, as such, measurement properties (i.e., structural-related validity) can be assessed via parameter estimates.

The path coefficients stemming from the path analysis component of the structural equation model take on the values of Pearson's product-moment correlation coefficients or standardized partial regression coefficients. Further, these paths suggest whether variables in the model are related to correlated effects, mediated effects, and/or independent effects (Onwuegbuzie & Daniel, in press). Unlike multiple regression analyses and other members of the general linear model, structural equation models allow researchers to specify the type of relationship among the independent variables when predicting one or more dependent variables. Moreover, structural equation modeling allows the specifying, testing, and interpreting of reciprocal relationships for observed variables (Arbuckle & Wothke, 1999; Schumacker & Lomax, 1996). Such reciprocal relationships are common among affective variables, as well as between affective variables and academic performance variables (e.g., Clément, 1980; Gardner, 1979, 1985; Onwuegbuzie et al., 2002, in press).

*The Anxiety-Expectation Mediation Model of Library Anxiety*

In incorporating the models of Onwuegbuzie et al. (2002) and Onwuegbuzie (in press), the Anxiety-Expectation Mediation (AEM) model of library anxiety was proposed for the present study, in which two individual difference variables (i.e., library anxiety and academic self-perception) act as factors that mediate the relationship between research proposal writing (RPW) performance and other cognitive, affective, personality, and demographic variables. Specifically, library anxiety and RPW achievement were hypothesized to affect each other in a reciprocal manner. That is, library anxiety and RPW achievement were related in such a manner that a change in either one would produce changes in the other, in order to reestablish the equilibrium. Library anxiety and academic self-perception were also hypothesized in the AEM model to be reciprocally related. With respect to the relationship between academic self-perception and RPW achievement, a reciprocal link between them was hypothesized as well.

*Theoretical Evidence for the Role of Library Anxiety in RPW Performance*

The AEM model of library anxiety stems from several theories of anxiety and social cognition. Specifically, the central role of library anxiety in the AEM model can be explained by using Wine's (1980) Cognitive-Attentional-Interference theory. According to Wine (1980), anxiety induces cognitive interference by causing the person involved to shift from task-relevant thoughts to task-irrelevant thoughts in evaluative situations. As such, it is very likely that library anxiety interferes with students' future academic performance by hindering their ability to receive, to concentrate on, and to encode

information obtained from library searches (Kuhlthau, 1988a, 1988b, 1989, 1991, 1993, 1994; Kuhlthau, Turock, George, & Belvin, 1990). Library anxiety may also decrease the efficiency with which memory processes are used in the library context, making it difficult to understand directions and advice provided by librarians or to read signs and maps that are posted in the library (Keefer, 1993; Kuhlthau, 1988a, 1991). In other words, it is likely that anxiety-induced cognitive interference impedes students' ability to apply new knowledge to a specific problem (e.g., conducting a library search), makes it difficult to recall what has been learned previously (Hembree, 1990), and hinders effective use of problem-solving strategies (Tobias, 1977, 1985). Students who are affected by interfering responses in libraries tend to focus much of their attention on task-irrelevant thoughts, resulting in diminished levels of performance. On the other hand, for students with low levels of library anxiety and those who are unaffected by interfering responses, anxiety elicits task-relevant responses that facilitate task completion (Kuhlthau, 1991) and, ultimately, cognitive performance (Wine, 1980).

The pivotal role of library anxiety in the AEM model can also be interpreted with respect to Onwuegbuzie et al.'s (in press) Information Literacy Process (ILP) model of library anxiety. According to the ILP model, library anxiety can occur at one or more of the following three phases: input, processing, and output. The input stage refers to when the student originally is exposed to the stimulus (e.g., the text). At this phase, high levels of library anxiety limit the extent to which new information can be preprocessed efficiently. The level of anxiety at this point depends on the student's capacity to identify, to attend to, to focus on, and to encode external stimuli

(Onwuegbuzie et al., in press). Library anxiety experienced at this stage may reduce the efficiency of the input, thereby minimizing the proportion of stimuli that is retained in long-term memory and which is needed for future tasks (Onwuegbuzie & Daley, 1996; Tobias, 1977).

The processing stage, which can also be characterized by anxiety, pertains to the point at which the student applies new understanding to the task (e.g., library search). Students exhibiting high levels of library anxiety at this phase are likely unable to apply new knowledge to the task (e.g., writing a research proposal). Library anxiety at the processing phase also represents the worry and emotionality experienced when the user is attempting to organize and to retain input (Onwuegbuzie et al., in press). Moreover, high levels of library anxiety at this juncture may decrease a user's capacity to understand the information extracted or to integrate new and old knowledge.

The output phase represents the final component of the ILP model. Library anxiety at this stage represents the apprehension evoked when students are required to demonstrate their ability to generate previous knowledge. More specifically, anxiety at this phase encompasses interference that comes to the fore after the information has been completely processed, but prior to it being reproduced effectively as output (Onwuegbuzie et al., in press). High anxiety levels at this phase might prevent the student from using the information extracted. According to Onwuegbuzie et al., other types of academic-related anxiety can worsen the situation at this point. For instance, if the goal of the library search is to obtain literature to write a research proposal, then writing anxiety (Daly & Miller, 1975a, 1975b, 1975c; Daly & Shamo, 1976, 1978; Daly &

Wilson, 1983; Onwuegbuzie, 1997a, 1998, 1999; Onwuegbuzie & Collins, 2001) or research anxiety can intensify the library anxiety levels experienced at the output stage, thereby threatening the quality of the research proposal (Onwuegbuzie, 1997a, 1997b, 1997c, 1997d).

*Theoretical Evidence for the Role of Academic Self-Perception in RPW Performance*

The mediating role of academic self-perception in the library context stems from Bandura's (1977, 1986) self-efficacy theory. According to this theory, self-efficacy is a focal point for most human behavior. Apparently, because of the cognitive capacity for self-referent thought, persons are able to evaluate their capabilities and to establish how confident they are that they will successfully undertake a specific task. Beliefs about their capacity to perform at a certain level (self-efficacy) greatly affect their actions (Bandura, 1997). Alternatively stated, self-efficacy pertains to judgments of how well one can undertake courses of actions required for solving a problem (Bandura, 1977, 1982). Therefore, self-efficacy theory posits that an individual's belief system influences his/her behavior choices, efforts expended, levels of persistence, and task accomplishment.

Research has consistently documented a positive relationship between self-efficacy and performance. For example, at the college level, self-efficacy has been found to predict subsequent academic grades (Silver, Smith, & Greene, 1999), even when the effect of previous measures of scholastic aptitudes and high school grades has been controlled (Lent, Brown, & Larkin, 1986).

Self-efficacy differs from self-perception inasmuch as the latter tends to be

influenced by reflected appraisals from significant others and both social (external) and internal comparisons (Marsh, 1986, 1987; Neemann & Harter, 1986; Rosenberg, 1979; Trent, Cooney, Russel, & Warton, 1996). Nevertheless, academic self-concept and self-efficacy are positively related. Further, self-efficacy theory posits that individuals prefer to engage in activities that they believe they can successfully negotiate, control, persist until the required level of performance has been met, and then assess their performance levels according to previous expectations. As such, students' academic self-perceptions are an important manifestation of their levels of self-efficacy, thereby justifying the use of Bandura's (1977, 1986, 1997) self-efficacy theory as a basis, in part, for the AEM model of library anxiety.

*Empirical Evidence for the Role of Library Anxiety in the AEM Model of Library Anxiety*

Perhaps the strongest empirical evidence of the central role library anxiety plays in the AEM model is that library anxiety has been found to predict students' ability to write research proposals (Onwuegbuzie, 1997a). Further, a relationship between library anxiety and academic achievement, as measured by grade point average, has also been documented (Jiao, Onwuegbuzie, & Lichtenstein, 1996). In addition, library anxiety has been found to be related to a myriad of variables that predict academic performance. For example, library anxiety has been found to be a function of learning style (Jiao & Onwuegbuzie, 1999a; Onwuegbuzie & Jiao, 1998a, 1998b), which in turn, has been found to predict performance in research methodology courses (Onwuegbuzie & Daley, 1997, 1998). Similarly, library anxiety has been associated with academic procrastination (Onwuegbuzie & Jiao, 2000), which has been found to predict

performance in quantitative-based research methodology courses (Onwuegbuzie, 1999/2000).

*Empirical Evidence for the Role of Self-Perception in the AEM Mode of Library Anxiety*

In addition to theoretical evidence, empirical evidence abounds suggesting that academic self-perception plays an important role in the library context. For instance, Mellon and her colleagues (Collins, Mellon, & Young, 1987; Mellon, 1988, 1989) noted that students with high levels of library anxiety tend to believe that their peers are adept at using the library, whereas they alone are inadequate; that their incompetence is a source of guilt and shame and consequently should be kept hidden, and that asking librarians questions reveals their ignorance. Consistent with these qualitative findings, levels of self-perception have been found to be an important predictor of library anxiety levels (Jiao & Onwuegbuzie 1999b). Moreover, in their Cognitive-Affective Stage (CAS) model of library anxiety, Onwuegbuzie et al. (in press) theorized that academic self-perception plays an important role at the library preparation stage. Unfortunately, if low self-perception increases a student's anxiety levels at the library preparation stage, it is likely to cause the student problems at the subsequent stage of the library task process, namely, the library use stage. Also, at the third stage, the library reflection stage, library anxiety stemming from poor academic self-concept can induce attributional biases, which are exacerbated when failure is experienced in completing a library task (Onwuegbuzie et al., in press). In turn, by internalizing the failure experience with attributions that center on their perceived self-competence, library-anxious students are more likely than are their counterparts to avoid future attempts to engage fully in library

tasks (Elliot & McGregor, 1999). This, in turn, would threaten successful completion of future library preparation and library use stages, resulting in a downward debilitative spiral (Onwuegbuzie et al., in press).

*Other Variables in the AEM Model of Library Anxiety*

In addition to library anxiety and academic self-perception, six other variables were included in the AEM model. These variables were age, grade point average, learning style, perfectionism, academic procrastination, and hope. Each of these variables has been found to be related to library anxiety (cf. Bostick, 1992; Jiao & Onwuegbuzie, 1997, 1998, 1999a; Jiao et al., 1996; Onwuegbuzie & Jiao, 1998a, 1998b, 1998c, 2000; Shoham & Mizrachi, 2001).

With respect to RPW performance, the following *Anxiety-Expectation Mediation* (AEM) *base* model of library anxiety was posited. The AEM base model is presented in Figure 1. It can be seen from this figure that it was hypothesized that library anxiety and academic self-perception serve as factors that mediate the relationship between RPW performance and other cognitive, personality, and demographic variables. Specifically, both library anxiety and academic self-perception were hypothesized to mediate the following six variables: age, grade point average, learning style, perfectionism, academic procrastination, and hope. These six variables were hypothesized to have a direct causal influence on library anxiety. That is, library anxiety mediated the relationship between RPW performance and grade point average, age, learning style, perfectionism, academic procrastination, and hope. Further, academic self-perception was hypothesized to mediate the relationship between RPW achievement and

academic procrastination and hope. Also, perfectionism and academic procrastination were hypothesized to be reciprocally related. Further, perfectionism is indirectly related to both academic self-perception and library anxiety through academic procrastination. Finally, as noted earlier, library anxiety and self-perception were hypothesized to be reciprocally related, as were both library anxiety and RPW performance and self-perception and RPW performance.

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Insert Figure 1 about here

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## Method

### *Participants*

The sample comprised all 225 graduate students from a number of disciplinary areas (e.g., education, nutrition, health sciences, speech-language pathology, kinesiology, nursing, and mathematics), who had enrolled in several sections of an introductory-level statistics/research methodology course over a two-year period at a mid-southern university. Participation was voluntary. In order to participate, students were required to give their consent by signing an informed consent document. Participants received extra course credit. No student declined to participate. All surveys were coded using student identification numbers in order to maximize confidentiality. The ages of the sample members ranged from 22 to 60 (mean = 31.6, *SD* = 8.8), with a mean grade point average of 3.62 (*SD* = 0.40). The majority of participants was female (80.0%).

*Instruments and Procedure*

Participants were administered the following seven instruments on the first day of class: (1) Library Anxiety Scale (LAS), (2) the Self-Perception Profile for College Students (SPPCS), (3) the Hope Scale, (4) the Procrastination Assessment Scale-Students (PASS), (5) the Multidimensional Perfectionism Scale (MPS), (6) the Productivity Environmental Preference Survey (PEPS), and (7) the Background Demographic Form (BDF).

The LAS was developed by Bostick (1992). This instrument conprises a 43-item, 5-point Likert-format scale that evaluates levels of library anxiety experienced by library users. The LAS contains the following five subscales: *barriers with staff*, *affective barriers*, *comfort with the library*, *knowledge of the library*, and *mechanical barriers*. *Barriers with staff* refer to the library users' perceptions that librarians are imposing, overwhelming, aloof, and inaccessible. More specifically, librarians are viewed as being too busy and too preoccupied to provide students with the needed help in conducting an effective library and information search. Librarians are viewed as having roles and tasks that are much more important than assisting students with their needs (Jiao et al., 1996). *Affective barriers* relate to students' feelings of incompetence while performing or attempting to perform library tasks. These feelings of ineptness are increased further by the supposition that other library users are more competent than they are in using the library (Mellon, 1986). *Comfort with the library* pertains to how comfortable, secure, welcoming, safe, and non-threatening users perceive the library to be. *Knowledge of the library* refers to the degree to which students believe they are familiar with the

library. Finally, *mechanical barriers* relate to anxieties that arise when students use mechanical library equipment such as computers, computer printers, and photocopy machines. A high score on any of the five subscales represents high anxiety in that area. For the present study, the subscales generated scores that had a classical theory alpha reliability coefficient of .93 (95% confidence interval [CI] = .92, .94) for barriers with staff, .90 (95% CI = .88, .92) for affective barriers, .72 (95% CI = .66, .77) for comfort with the library, .69 (95% CI = .62 .75) for knowledge of the library, and .68 (95% CI = .60, .75) for mechanical barriers.

The SPPCS (Neemann & Harter, 1986) is a 54-item scale, comprising 13 subscales (i.e., perceived creativity, perceived intellectual ability, perceived scholastic competence, perceived job competence, perceived athletic competence, perceived appearance, perceived romantic relationships, perceived social acceptance, perceived close friendships, perceived parent relationships, perceived humor, perceived morality, and perceived global self-worth). The SPPCS was selected instead of other measures of self-perception because it is one of the most administered scales of its type (Onwuegbuzie & Daley, 1999). In order to ensure model parsimony, only the academic-related subscales of the SPPCS were used in this study, namely, perceived creativity, perceived intellectual ability, and perceived scholastic competence. For the current investigation, these three subscales generated scores that had a classical theory alpha reliability coefficient of .88 (95% CI = .85, .90) for perceived creativity, .86 (95% CI = .83, .89) for perceived intellectual ability, and .80 (95% CI = .75, .84) for perceived intellectual ability.

The Hope Scale consists of 12 items, of which four are fillers (Snyder et al. 1991). The remaining eight items consist of four agency items and four pathways items. According to its authors, the agency items attempt to tap the sense of successful determination with respect to the individuals' goals. Conversely, the pathways items refer to individuals' cognitive appraisals of their ability to overcome goal-related obstacles and to reach their goals. For the present inquiry, these two subscales yielded scores that had a classical theory alpha reliability coefficient of .76 (95% CI = .70, .81) for agency and .65 (95% CI = .57, .72) for pathways.

The PASS, which was developed by Solomon and Rothblum (1984), contains two parts. The first part presents six academic tasks involving writing a term paper, studying for examinations, keeping up with weekly reading assignments, performing administrative tasks, attending meetings, and performing academic tasks in general. Respondents are asked to complete three rating scales for each of the six tasks indicating the frequency with which they procrastinate on that task (1 = Never procrastinate; 5 = Always procrastinate), whether their procrastination on the task is a problem (1 = Not at all a problem; 5 = Always a problem), and whether they want to decrease their procrastination on the task (1=Do not want to decrease; 5 = Definitely want to decrease). As recommended by its authors, the PASS items pertaining to (a) the frequency with which respondents procrastinate on a task and (b) whether their procrastination on that task is a problem were aggregated to provide an overall measure of academic procrastination, with total scores ranging from 12 to 60. Higher scores are indicative of self-reported academic procrastination.

The second section of the PASS asks students to think of the last time they procrastinated on writing a term paper and to indicate how much each of 26 reasons reflects why they procrastinated (1 = Not at all reflects why I procrastinated; 5 = Definitely reflects why I procrastinated). A factor analysis undertaken by the authors of the instruments on the reasons why college students procrastinate indicated two factors, namely, fear of failure and task aversiveness. These were the two scales that were used in this study. For the present research, the coefficient alpha reliability estimates of the PASS subscales were .84 (95% CI = .80, .87) for the fear of failure factor and .64 (95% CI = .55, .71) for the task aversiveness factor.

The MPS (Hewitt & Flett, 1991a) is a 45-item, 7-point Likert-format instrument designed to measure the following three dimensions of perfectionism: self-oriented, other-oriented, and socially prescribed. According to its authors, self-oriented perfectionism is an intrapersonal dimension characterized by a strong internal desire to be perfect. Apparently, self-oriented perfectionists tend to set and to pursue rigid and unrealistically high standards for themselves, and to undertake stringent self-appraisal in an attempt to attain perfectionism and to avoid failure (Hewitt & Flett, 1991a, 1991b). Other-oriented perfectionists hold unrealistically high standards for significant others, place importance on other individuals being perfect, and evaluate others' behavior critically. Thus, other-oriented perfectionism is similar to self-oriented perfectionism, the major difference being that the expectation of perfect performance is directed toward others. Finally, socially prescribed perfectionists believe that significant others (e.g., friends, family, professors, peers) hold unrealistic standards for them, rigorously

evaluate them, and pressure them to be perfect. Negative emotions that occur in socially prescribed perfectionists may arise from an inability to meet the perceived expectations of significant others, the belief that significant others are being unrealistic in their expectations, or both (Hewitt & Flett, 1991a). A high score on any subscale represents a tendency to be perfectionistic on the dimension measured by that scale. For the current inquiry, the coefficient alpha reliability estimates of the MPS subscales were .86 (95% CI = .83, .89) for the self-oriented, .70 (95% CI = .64, .75) for the other-oriented, and .84 (95% CI = .80, .87) for the socially prescribed subscales.

The PEPS (Dunn, Dunn, & Price, 1991) is an instrument that surveys individuals' preferences in each of 20 different modalities. The instrument represents a comprehensive method of identifying preferences in how adults function, learn, concentrate, and perform during educational or work activities in the following modalities: (a) environment (i.e., sound, temperature, light, and design); (b) emotionality (e.g., motivation, responsibility, persistence, and the need for either structure or flexibility); (c) sociological preferences (i.e., learning alone or with peers); and (d) physical needs (e.g., perceptual preferences(s), time of day, intake, and mobility). The following 20 modalities are contained in the PEPS: noise, light, temperature, design, motivation, persistence, responsibility, structure, peer orientation, authority orientation, multiple perceptual preferences, auditory, visual, tactile, kinesthetic, intake, evening, morning, afternoon, and mobility. Scores on each of the 20 modalities are expressed in standard score units, with a mean of 50 and a standard deviation of 10. For the sake of parsimony, subscale scores were summed to yield the following four scales that were used in the study: environment,

emotionality, sociological preferences, and physical needs. Unfortunately, the score reliabilities pertaining to the PEPS subscales used for the present study were not available because the PEPS was scored by its owners.

The BDF, developed specifically for this study, extracted relevant information such as age, sex, and students' overall academic achievement, as measured by their grade point average.

## Results

Table 1 presents the means and standard deviations of all variables. However, because of the size of the correlation matrix, the matrix is not reported here. Interested readers can contact the authors for this information. In any case, as recommended by researchers (e.g., Onwuegbuzie & Daniel, in press; Thompson & Daniel, 1996), the variance-covariance matrix was used to conduct the structural equation modeling. The two-step approach to structural equation modeling, as recommended by Anderson and Gerbing (1989), was utilized in this study. Specifically, the first step consisted of estimating the initial measurement model. In this model, the subscales were forced to load on their expected factors, with factors allowed to correlate. The second step involved an estimation of the AEM structural model specifying paths as outlined above. The structural equation model was undertaken using Amos 3.61 (Arbuckle, 1997).

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Insert Table 1 about here

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*Step 1: Measurement Model*

Confirmatory factor analysis was used to test the measurement model. The covariance matrix was analyzed using the maximum estimation method. Adequacy of model fit was assessed via the chi-square ($\chi^2$) test. However, because this test is extremely sensitive to sample size (Bentley, 1990; Schumaker & Lomax, 1996), other fit indices were employed. Specifically, the ratio of chi-square statistic to degrees of freedom ($\chi^2/df$) was used. Also, an independence model was tested to allow computation of the relative fit index (RFI), the incremental fit index (IFI), the Tucker-Lewis index (TLI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), the normed fit index (NFI), and the incremental fit index (IFI) (Bentler, 1990; Bentler & Bonett, 1980; Bollen, 1986, 1989; Browne & Cudeck, 1993; Schumaker & Lomax, 1996). Reporting and interpreting several fit indices is consistent with the recommendations of the majority of researchers who utilize structural equation modeling techniques (Gerbing & Anderson, 1993). In fact, as noted by Schumacker and Lomax (1996, p. 120), there is "no *single* statistical test of significance that identifies a correct model given the sample data" [emphasis in original]

The test of the measurement model revealed the following fit indices: ($\chi^2 = 295.3$, $df = 171$, $p < .05$; $\chi^2/df = 1.73$; RFI = .96; IFI = .99; TLI = .98; CFI = .99; RMSEA = .05; NFI = .98). The chi-square statistic was statistically significant, which suggests an inadequate fit; however, it should be noted that samples sizes that exceed 200, as in the present study, tend to increase the probability that the chi-square test will yield statistical significance (Schumacker & Lomax, 1996). Further, the ratio of chi-square to

degrees of freedom (1.73) was well below the cut-off criterion of adequate fit of 2 to 1 recommended by most researchers (e.g., Byrne, 1989). Also, all other goodness-of-fit measures reported above were much greater than the cut-off point of both .90 (e.g., Bentler & Bonett, 1980; Hu & Bentler, 1995) and .95 (Hu & Bentler, 1999) that have been recommended by researchers for demonstrating model adequacy. Finally, the fact that the RMSEA was in the .05 or less range suggests that a close fit of the model in relation to the degrees of freedom (Browne & Cudeck, 1993). Also, the parameter estimates were interpretable. In fact, all the factor loadings were statistically significant ($p < .01$). Moreover, these loadings, which are presented in Table 2, were all large, ranging from 0.62 (mechanical barriers) to .93 (comfort with the library). These loadings provided convergent validity for the measures.

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Insert Table 2 about here

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*Step 2: Structural Model*

The AEM base model suggested a reasonable fit to the data ($\chi^2 = 422.03$, $df = 199$, $p < .05$; $\chi^2/df = 2.12$; RFI = .91; IFI = .92; TLI = .94; CFI = .93; RMSEA = .07; NFI = .95). The appropriate indices were above .90. However, the ratio of chi-square to degrees of freedom (2.12) was slightly above the cut-off criterion for adequate fit of 2 to 1. Additionally, the RMSEA was above .05, suggesting only a reasonable error of approximation. Moreover, the following four paths were not statistically significant: (a) the direct path from hope to library anxiety, (b) the direct path from perfectionism to

library anxiety, (c) the direct path from library anxiety to academic self-perception, and (d) the direct path from RPW achievement to academic self-perception. These paths were removed and the modified AEM model tested, as recommended by researchers (e.g., Kline, 1998; Lomax, 1982).

The final path model is displayed in Figure 2. With the exception of the chi-square statistic, which was statistically significant, all criteria used indicated an adequate fit of the theoretical data to the model ($\chi^2 = 352.05$, $df = 203$, $p < .05$; $\chi^2/df = 1.73$; RFI = .95; IFI = .96; TLI = .97; CFI = .95; RMSEA = .05; NFI = .98). These indices combined suggested that the AEM model was an excellent explanation of the data.

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Insert Figure 2 about here

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A bootstrap analysis (Schumaker & Lomax, 1996) was undertaken to assess the stability of the path coefficients. Bootstrapping involves re-sampling the data a specified (large) number of times to generate bootstrap estimates and standard errors. These sample bootstrap estimates and standard errors are then averaged and used to obtain confidence intervals around the average of the bootstrap estimates (i.e., bootstrap estimators). The bootstrap estimators and their corresponding confidence intervals are subsequently used to establish how stable the sample statistic is as an estimate of the population parameter. The bootstrap estimates ($n = 500$) (not presented) indicated that all the path coefficients in the final AEM model were stable and statistically significantly different from zero--thereby providing further support for the model.

Figure 2 indicates a direct negative effect (-.68) of library anxiety on RPW achievement, as well as a direct negative effect of RPW achievement (-.43) on library anxiety. That is, as hypothesized, library anxiety and RPW achievement were reciprocally related. Furthermore, library anxiety mediated the relationship between RPW achievement and the following variables: age, grade point average, learning style, academic procrastination, and academic self-perception. Specifically, the oldest students (.41), those with the highest levels of overall academic achievement (.44), those with the most clearly defined learning styles (.45), those with the highest levels of academic procrastination (.64), and those with the lowest levels of academic self-perception (-.72) tended to have the highest levels of library anxiety.

The path diagram also shows a direct positive path from academic self-perception (.43) to RPW achievement, but no direct path from RPW achievement to academic self-perception. Furthermore, academic self-perception moderated the relationship between RPW achievement and academic procrastination and hope. Specifically, students with the highest levels of academic procrastination (-.63) and those with the lowest levels of hope (.62) tended to have the lowest levels of academic self-perception. Also, academic procrastination was reciprocally related to academic self-perception, with academic self-perception (-.70) also predicting academic procrastination. Similarly, academic procrastination and perfectionism were reciprocally related, with academic procrastination (.61) predicting levels of perfectionism, and levels of perfectionism (.77) predicting levels of academic procrastination. Finally, it should be noted that library anxiety and academic self-perception were not reciprocally

related. More specifically, although there was a direct negative path from academic self-perception to library anxiety (-.72), no such path was found from library anxiety to academic self-perception.

## Discussion

The purpose of the present study was to test a model of library anxiety for predicting academic performance among graduate students. Despite the prevalence of library anxiety among college students (Mellon, 1986; Onwuegbuzie et al., in press), and the fact that library anxiety has been found to impede specific library tasks (Keefer, 1993; Kuhlthau, 1988a, 1991), no researcher has examined empirically whether library anxiety can be linked to overall educational outcomes prior to the present study. Moreover, no study has investigated the role of library anxiety in graduate-level performance. This is surprising because (a) theses and dissertations typically necessitate extensive use of libraries and the related information resources, and (b) a significant proportion of students do not complete their theses and dissertations, and hence their graduate degree programs (Bowen & Rudenstine, 1992; Cesari, 1990). Moreover, the current investigation represents the first attempt to use structural equation modeling techniques in the library context. As such, the results of the present research make an important contribution to the literature of library anxiety study in particular and the library and information science in general.

The major finding in this study is that both library anxiety and academic self-perception mediate the relationship between students' ability to write research proposals and other cognitive, affective, and demographic variables, thereby providing

support for the Anxiety-Expectation Mediation (AEM) model of library anxiety. Encouragingly, it should be noted that with the exception of the chi-square test, which likely reflected the relatively large sample size (Schumacker & Lomax, 1996), all fit indices strongly suggest that the fit of the AEM model is adequate.

*Role of Library Anxiety on Research Performance*

The central role of library anxiety in the AEM model suggests that Wine's (1980) Cognitive-Attentional-Interference theory can be applied to the library and information context. Under the present model, Wine's (1980) theory predicts that library anxiety hinders information search performance by impeding students' ability to receive, to concentrate on, and to encode information necessary for the research proposal. In addition, it is likely that library anxiety decreases the efficiency with which memory processes are activated while conducting library searches, making it difficult to undertake an adequate review of the relevant literature. More specifically, library anxiety initiates or promotes cognitive interference by causing the library user to shift from task-relevant to task-irrelevant thoughts (Wine 1980), likely leading to search avoidance behaviors. The AEM model further suggests that the extent to which cognitive interference affects performance is, at least in part, a function of the student's age, grade point average, learning modalities, academic procrastination, and academic self-perception. It appears that the oldest students, those with the highest levels of overall academic achievement, those with the most clearly defined learning styles, those with the highest levels of academic procrastination, and those with the lowest levels of academic self-perception are most at-risk for having levels of library anxiety

mediate their ability to write research proposals.

The pivotal role of library anxiety in the AEM model can also be explained via Onwuegbuzie et al.'s (in press) Information Literacy Process (ILP) model of library anxiety. In particular, the ILP model postulates that library anxiety can occur at the input, processing, and/or output stages of the information literacy process. The input stage refers to the time when the student originally receives the stimulus (e.g., the text). At this phase, high levels of library anxiety limit the extent to which new information can be preprocessed efficiently. The level of anxiety at this point depends on the student's capacity to identify, to attend to, to focus on, and to encode external stimuli (Onwuegbuzie & Daley, 1996; Tobias, 1977). In turn, this capacity is likely a function of many factors such as the student's age, grade point average, learning modalities, academic procrastination, and academic self-perception.

The second stage, the processing stage, marks the point at which the library user applies new understanding to the library search task. Students exhibiting high levels of library anxiety at this phase likely are unable to apply new knowledge to the task (e.g., writing a research proposal). Moreover, high levels of library anxiety at this point may decrease a students' capacity to understand the information extracted or to integrate new and old knowledge (Onwuegbuzie et al., in press). This, in turn, might affect their ability to conduct adequately an effective literature review and, subsequently, to write a research proposal. Again, the AEM model suggests that those most at risk are the oldest students, those with the highest levels of overall academic achievement, those with the most clearly defined learning styles, those with the highest

levels of academic procrastination, and those with the lowest levels of academic self-perception.

The output phase, the final stage, represents the apprehension experienced when students are required to demonstrate their ability to generate previous knowledge. Library anxiety at this phase encompasses interference that arises after the information has been completely processed, but prior to it being reproduced effectively as output (Onwuegbuzie et al., in press). High anxiety levels at this phase might prevent the student from using the information extracted. Other types of academic-related anxiety (e.g., research anxiety, writing anxiety) can heighten levels of library anxiety at this point, and moreover, exacerbate the negative impact of library anxiety on the output produced, such as the quality of the research proposal (Onwuegbuzie et al., in press). As is the case for the two prior stages, the effect of library anxiety on academic performance at this phase is likely a function of the student's age, grade point average, learning modalities, academic procrastination, and academic self-perception.

The result that library anxiety is related negatively to academic performance represents the first empirical evidence to date of the potentially debilitative effect of library anxiety on course grades. However, replications of this study are needed before any firm conclusions are made. Nevertheless, the extent to which this anxiety-achievement link is causal increases the importance of the role of librarians in helping to minimize library users' levels of anxiety. In any case, researchers should investigate the effect of interventions that have been found to reduce anxiety levels, such as teaching Kuhlthau's Information Search Process (ISP) model (Kracker, 2002; Kracker &

Wang, 2002) on academic performance.

*Role of Academic Self-Perception on Research Performance*

The importance of academic self-perception in the AEM model suggests that Bandura's (Bandura, 1977, 1982, 1986, 1997) self-efficacy theory can also be applied to the library and information context. Self-efficacy theory suggests that an individual's belief system influences his or her behavior choices, efforts expended, levels of persistence, and task success in the library and information context (Bandura, 1977, 1982, 1986, 1997). Further, the finding that academic self-perception predicts achievement in a research class indicates that a self-fulfilling prophecy prevails. Students who have low perceived self-competence of their ability to use the library exhibit actions and inactions that may culminate in underachievement.

Interestingly, although a reciprocal relationship between academic self-perception and library anxiety was hypothesized, a uni-directional relationship was found, with a direct negative path from academic self-perception to library anxiety emerging, but no such path from library anxiety to academic self-perception. Future research should investigate the reliability of this finding. Nevertheless, the finding that the relationship between self-perception and the ability to write a research proposal was mediated by library anxiety is consistent with that of Mellon (1986, 1988), who noted that students often perceive that their peers are proficient at using the library, whereas they alone are incompetent (Collins et al., 1987; Mellon, 1986, 1988, 1989). This result is also consistent with that of Jiao and Onwuegbuzie (1999b) who documented that self-perception is an important predictor of library anxiety. As such, interventions aimed

at increasing students' academic self-perception to utilize the library in general and to conduct library searches and literature reviews in particular may have a direct positive effect on the research performance of these students in these information-intensive and research-demanding courses. Future experimental studies could play an important role in testing this reciprocal relationship between self-perception and library anxiety.

Even though the current data appear to provide strong support for the AEM model of library anxiety, caution should be exercised in interpreting the findings because other competing models might have been hypothesized that fit these data equally well, or even more adequately. Significant path coefficients indicate the correctness of the model specification, but they do not establish whether the data would fit a model with different paths and containing additional variables. In fact, it is likely that some important variables were omitted from the structural equation model. For example, it is possible that levels of reading comprehension and reading vocabulary could play an important role in the AEM model because these variables have been found to predict library anxiety (Jiao & Onwuegbuzie, 2002a). Similarly, it is possible that social interdependence can be included in the model because this variable has also been found to be related to library anxiety (Jiao & Onwuegbuzie, 2002b).

## Conclusions

Despite the complexity of structural equation modeling, it should be noted that it does not allow causal links to be determined (Onwuegbuzie & Daniel, in press). Thus, the causal ordering among library anxiety, academic self-perception, and performance in research methodology courses remains to be determined. However, causal ordering

cannot be established until time precedence among these variables is determined via longitudinal studies using structural equation modeling techniques (Byrne, 1984). Nevertheless, the present findings offer one possible model that explains how library anxiety can mediate the relationship between students' research performance and the cognitive, affective, personality, and demographic variables. As such, the present study is an important first step in understanding the role of library anxiety in the classroom environment. The next logical step should be to test the AEM model of library anxiety using various educational outcome measures, different academic disciplines, and numerous college populations.

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Table 1

*Mean and Standard Deviation for All Variables*

| Variable | *M* | *SD* |
|---|---|---|
| Age | 31.72 | 8.37 |
| GPA | 3.65 | 0.39 |
| Environment | 50.59 | 3.67 |
| Emotionality | 52.67 | 3.82 |
| Sociological preferences | 53.69 | 7.75 |
| Physical needs | 51.27 | 2.04 |
| Self-oriented perfectionism | 72.51 | 13.00 |
| Other-oriented perfectionism | 61.65 | 9.16 |
| Socially prescribed perfectionism | 52.78 | 12.47 |
| Task aversiveness | 7.64 | 2.76 |
| Fear of failure | 10.42 | 4.69 |
| Pathways | 12.54 | 1.75 |
| Agency | 13.54 | 1.78 |
| Perceived creativity | 10.95 | 3.04 |
| Perceived intellectual ability | 12.83 | 2.69 |
| Perceived scholastic competence | 12.29 | 2.40 |
| Barriers with staff | 31.95 | 9.52 |
| Affective barriers | 30.08 | 8.97 |
| Comfort with the library | 18.03 | 4.14 |
| Knowledge of the library | 9.78 | 2.64 |
| Mechanical barriers | 7.88 | 2.29 |
| Research proposal writing achievement | 86.56 | 8.87 |

Table 2

*Factor Loadings for the Measurement Model*

| Variable | Factor Loading |
|---|---|
| Environment | .82 |
| Emotionality | .81 |
| Sociological preferences | .67 |
| Physical needs | .71 |
| Self-oriented perfectionism | .84 |
| Other-oriented perfectionism | .83 |
| Socially prescribed perfectionism | .81 |
| Task aversiveness | .81 |
| Fear of failure | .81 |
| Pathways | .86 |
| Agency | .86 |
| Perceived creativity | .75 |
| Perceived intellectual ability | .87 |
| Perceived scholastic competence | .88 |
| Barriers with staff | .88 |
| Affective barriers | .82 |
| Comfort with the library | .93 |
| Knowledge of the library | .75 |
| Mechanical barriers | .62 |

Figure 1. Anxiety-Expectation Mediation Base Model of Library Anxiety.

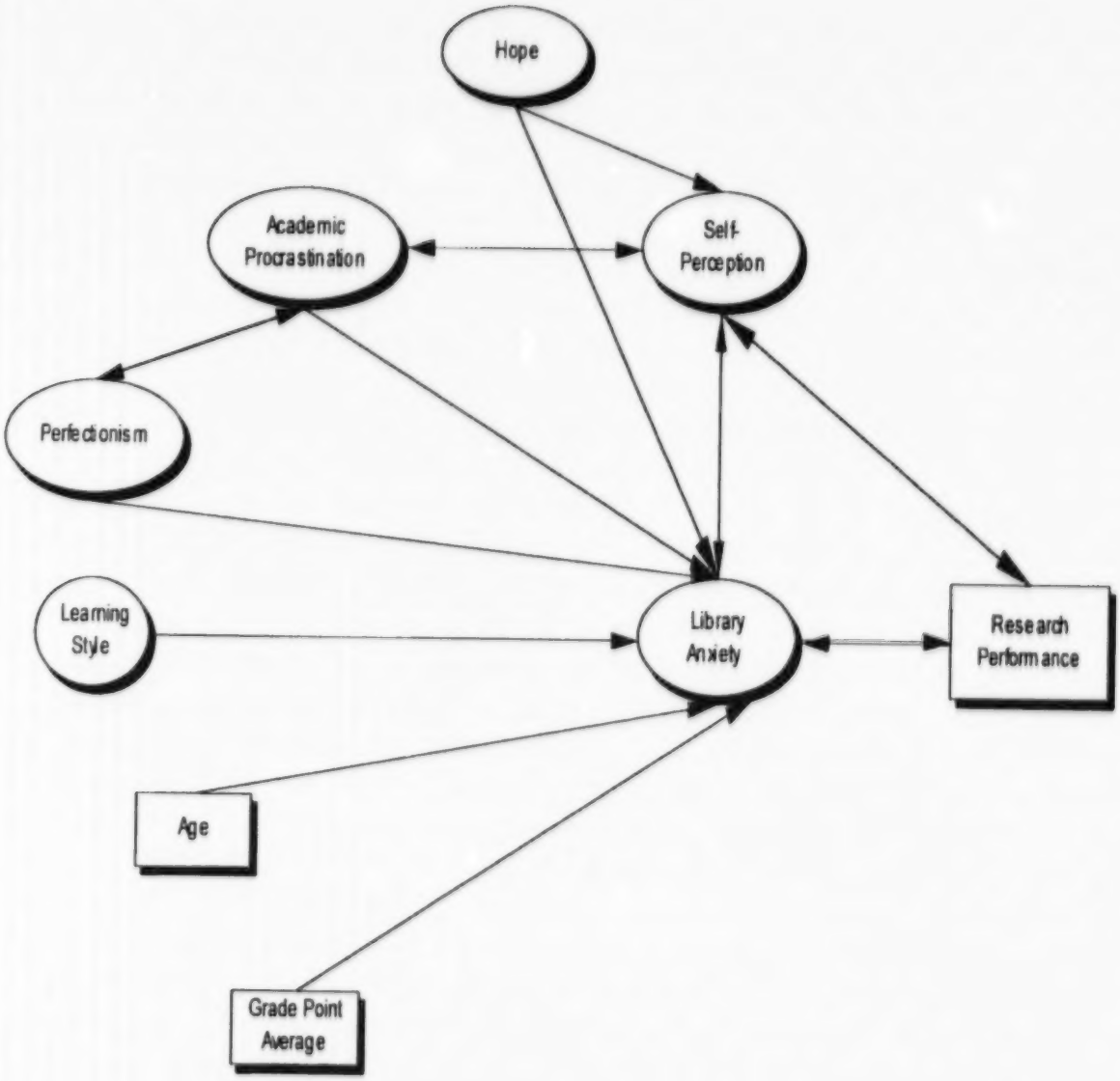


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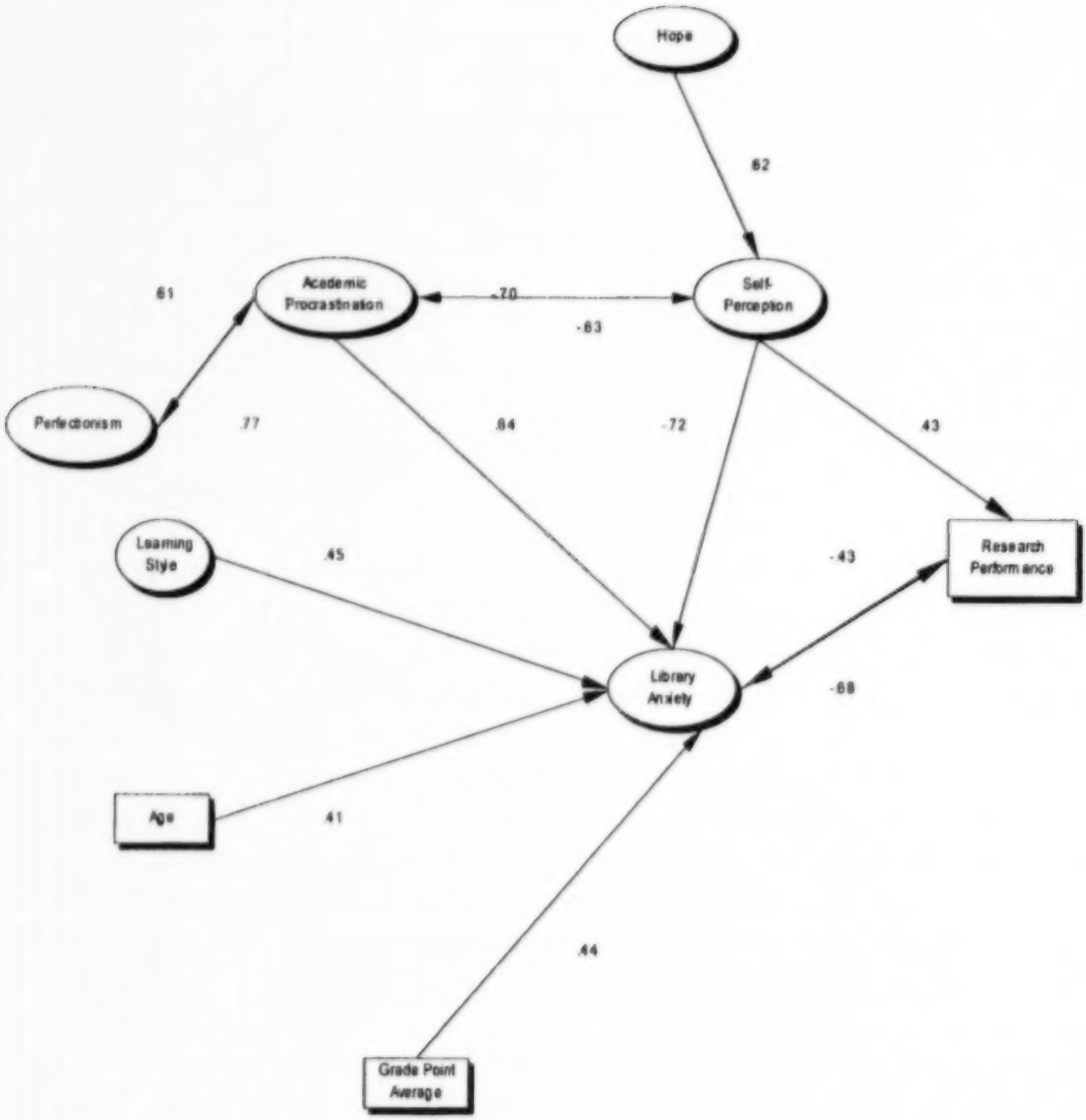
Figure 2. Final Anxiety-Expectation Mediation Model of Library Anxiety.




Note: In order to simplify presentation of the AEM model, observed indicators (i.e., subscales) are not shown.

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